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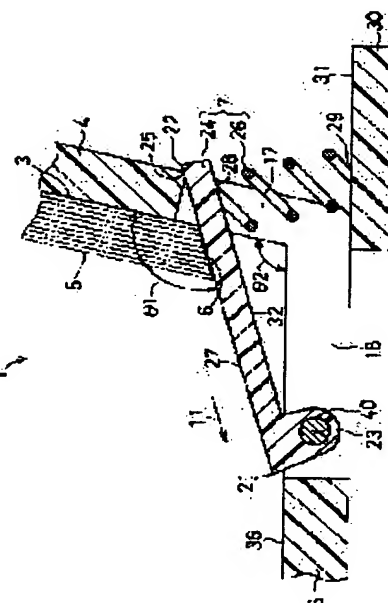
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(54) PAPER FEEDING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a paper feeding device capable of feeding recording sheets of paper certainly separated one by one even in the case the sheets are inserted into the device with an impact force.

SOLUTION: A resiliently supporting means 7 to support the bottoms 6 of recording sheets of paper 5 resiliently is installed near the lower part of the back plate 4 of this paper feeding device 1. The means 7 includes a swing support piece 24 and a spring 26, wherein the swing support piece 24 makes angular displacement round an axis 23 perpendicular to the sheet feeding direction when the sheets 5 are inserted to the device 1, and absorbs the impact force of the sheets being inserted. When the impact force is released, the piece 24 abuts to a predetermined holding part 25 with an upward directed spring force, and the angle formed by the placing surface 27 of the piece 24 and the supporting surface 3 of the back plate 4 is kept to the angle $\theta 1$ which is favorable for sheet feeding.



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CLAIMS

[Claim(s)]

[Claim 1] The background which has the back face set up by inclining caudad as it becomes the feed direction downstream, The support means from a cartridge which supports the lower limit of the recording paper which is arranged near the lower part of the background and supported by the background in a from cartridge, Feed equipment characterized by including the feed roller which is arranged at the feed direction downstream, contacts the bottom plate to which it shows the recording paper, and the maximum top face of the recording paper on a back face, and feeds paper to the topmost recording paper rather than the support means from a cartridge.

[Claim 2] The piece of rocking support to which the support means from a cartridge is supported possible [an angular displacement] at the circumference of an axis with the feed direction downstream edge perpendicular to the feed direction, and the feed direction upstream edge exists back rather than the back face of the background, The spring which the other spring force is given [spring] up to said upstream edge of the piece of rocking support, and makes said upstream edge of the piece of rocking support contact the location defined beforehand in the state of the standing of the recording paper by which the laminating was carried out is included. Feed equipment according to claim 1 with which the include angle θ_1 of the installation side of the piece of rocking support and the back face of the background to make is characterized by larger being $\theta_1 > \theta_2$ than the include angle θ_2 of the back face of the background, and the slideway of a bottom plate to make in the state of the standing of the recording paper by which the laminating was carried out.

[Claim 3] Feed equipment according to claim 1 or 2 characterized by for two or more pieces of rocking support opening spacing perpendicularly, and arranging them to the feed direction.

[Claim 4] Feed equipment according to claim 1 to 3 characterized by preparing the heights formed in the installation side of the piece of rocking support by being distributed in the feed direction.

[Claim 5] The recording device containing the feed equipment of any one publication of claim 1-4, and the print head printed on the recording paper by the feed direction downstream rather than the bottom plate of feed equipment.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the feed equipment for feeding the recording paper with which the recording device used with a communication device, an information processor, etc. is equipped.

[0002]

[Description of the Prior Art] The approach for feeding one sheet of form at a time is variously used for the feed equipment with which the recording device used for a communication device, an information processor, etc. is equipped. For example, the approach to which paper is fed when one of the recording papers which pushed up the base of a cassette in which the recording paper is laid by means of a spring etc., pressed down the both ends by the side of the feed direction tip of the recording paper by the pawl, extruded the laid recording paper in the feed direction with the feed roller, and were laid two or more sheets of the outermost layer exceeds the inhibition force of a pawl. Moreover, the approach to which paper is fed when the recording paper is fed between the large inhibition members of coefficient of friction of the rubber contacted by a feed roller and the feed roller, a feed roller is rotated in the feed direction and only one by the side of a feed roller overcomes the inhibition force of an inhibition member. Moreover, it is the approach by which paper is fed only to one by the side of the front face of the recording paper to which the roller which rotates to the feed direction and an opposite direction is arranged on the rear-face side of the recording paper laid two or more sheets, the 2nd [or less] recording paper is recommended with the roller which rotates to the feed direction and an opposite direction, and is returned [the roller which rotates in the feed direction is arranged on the front-face side of the form to which paper is fed,], and paper is fed. Moreover, the 1st sheet of the side to which paper is fed is raised with a vacuum suction force by vacuum suction, and the 2nd [or less] recording paper is an approach to which paper is fed the 1st sheet by preventing feeding by the force attracted with a vacuum aspirator from the opposite side.

[0003] The feed equipment using the include-angle separation approach which carries out separation feeding of the recording paper can realize separation feeding of the recording paper with easy structure by the background which has the back face which lays and supports the recording paper to the above-mentioned feed approach, and the bottom plate which has the include angle beforehand set to the feed direction downstream of the background, is arranged, and separates the recording paper. Moreover, although it is easy structure, since the range of the usable thickness of the recording paper is wide and the necessary area of equipment is small, the floor space of the recording device carrying feed equipment as a result the communication device which uses a recording device, and an information processor can be made small. The include-angle separation approach has come [furthermore, / if the feed roller which feeds paper to the recording paper is made into a semicircle after separating one sheet of recording paper and starting feeding, and it is made the configuration which does not give a load to it as a feed roller does not contact the recording paper with which feeding was started / the advantage which can carry out smooth feeding at the time of printing / are and] to be used abundantly.

[0004] The include-angle separation approach is not necessarily thoroughgoing in the point of feeding certainly at a time one sheet of recording paper covering the range where thickness is large although it is an approach with an advantage, and JP,9-12168,A etc. is indicated as advanced technology for the cure. the bottom plate (in the advanced technology, it is also called a division plate) which fixed the include angle in this advanced technology -- in addition, the auxiliary division plate which consists of an elastic member which contacts an acute angle rather than said division plate to a form is prepared. Without being

bent by the feed direction downstream of the recording paper, and an include angle's becoming large, and feeding resistance becoming small, and seldom being bent by the feed direction upstream, an auxiliary division plate has strong feeding resistance, while an include angle is small. That is, it enables it to ensure separation and feeding also to the form of various thickness using bending of an auxiliary division plate.

[0005]

[Problem(s) to be Solved by the Invention] There are the following problems in this advanced technology. When the user of feed equipment inserts the recording paper in feed equipment and the recording paper is inserted with impulse force, the lower limit of two or more sheets may enter the direction of a division plate among the recording papers which inserted the recording paper across the boundary of the background and a division plate. If the lower limit of two or more sheets of recording papers starts feeding in the condition of having entered into the division plate, since the function in which a division plate separates one sheet of recording paper at a time cannot be demonstrated about two or more sheets of recording papers which already entered into the division plate, the phenomenon which feeds two or more sheets into coincidence happens.

[0006] Separation feeding of the recording paper by the division plate and auxiliary division plate of the advanced technology When the recording paper is normally inserted in feed equipment, one sheet can carry out separation feeding at a time even if the thickness of the recording paper is various and a user inserts the recording paper in feed equipment, In the unusual condition of saying that the lower limit of two or more sheets of recording papers will enter into a division plate, separation feeding of every one sheet of recording paper cannot be carried out.

[0007] This invention is offering a recording device equipped with the feed equipment and it which can carry out separation feeding of every one sheet of recording paper certainly from from immediately after inserting the recording paper, even when the recording paper is inserted in feed equipment with impulse force.

[0008]

[Means for Solving the Problem] The background which has the back face set up by inclining caudad as this invention becomes the feed direction downstream, The support means from a cartridge which supports the lower limit of the recording paper which is arranged near the lower part of the background and supported by the background in a from cartridge, It is feed equipment characterized by including the feed roller which is arranged at the feed direction downstream, contacts the bottom plate to which it shows the recording paper, and the maximum top face of the recording paper on a back face, and feeds paper to the topmost recording paper rather than the support means from a cartridge.

[0009] If this invention is followed, since the support means from a cartridge which supports the lower limit of the recording paper supported by the background in a from cartridge will be established near the lower part of the background, even when a user inserts the recording paper in feed equipment with impulse force, impulse force when the supporter material from a cartridge inserts the recording paper can be absorbed. Therefore, since the impulse force when inserting the recording paper in feed equipment is eased by the supporter material from a cartridge, when the recording paper can prevent entering the direction of a bottom plate and feeds the recording paper, two or more sheets are not fed into coincidence.

[0010] Moreover, the piece of rocking support to which this invention is supported possible [an angular displacement] at the circumference of an axis with the feed direction downstream edge perpendicular [the support means from a cartridge] to the feed direction, and the feed direction upstream edge exists back rather than the back face of the background, The spring which the other spring force is given [spring] up to said upstream edge of the piece of rocking support, and makes said upstream edge of the piece of rocking support contact the location defined beforehand in the state of the standing of the recording paper by which the laminating was carried out is included. It is feed equipment with which the include angle θ_1 of the installation side of the piece of rocking support and the back face of the background to make is characterized by larger being $\theta_1 > \theta_2$ than the include angle θ_2 of the back face of the background, and the slideway of a bottom plate to make in the state of the standing of the recording paper by which the laminating was carried out.

[0011] When following this invention and the recording paper is inserted in feed equipment with impulse force since the support means from a cartridge contains the piece of rocking support and the spring in which an angular displacement is possible, the angular displacement of the piece of rocking support carries out, it absorbs impulse force, and the include angle of the installation side of the piece of rocking support and the back face of the background make is held in the location which becomes with θ_1 and which is defined beforehand, putting the recording paper, where impulse force is removed. Therefore,

since the include angle of the installation side of the piece of rocking support and the back face of the background to make is maintained at the suitable include angle θ_1 defined beforehand when the recording paper does not enter the direction of the installation side of the piece of rocking support according to the impulse force at the time of insertion when inserting the recording paper in feed equipment, and starting separation feeding of the recording paper, one sheet can carry out separation feeding at a time certainly in the recording paper. Moreover, since the include angle θ_1 of the installation side of the piece of rocking support and the back face of the background to make is larger than the include angle θ_2 of the back face of the background, and the slideway of a bottom plate to make, the recording paper with which separation feeding was started does not have feeding inhibited by the slideway of a bottom plate, and is fed smoothly.

[0012] Moreover, this invention is feed equipment characterized by for two or more pieces of rocking support opening spacing perpendicularly, and arranging them to the feed direction.

[0013] If this invention is followed, according to the dimension of the recording paper fed, the number of the pieces of rocking support which support the lower limit of the recording paper differs. Therefore, the force in which the installation side of the piece of rocking support inhibits feeding of the recording paper in contact with the lower limit of the recording paper will be adjusted by the number of the pieces of rocking support which contact the lower limit of the recording paper, and separation feeding of the recording paper is smoothly performed by the contact to the piece of rocking support of the number according to the dimension of the recording paper, and a recording paper lower limit.

[0014] Moreover, this invention is feed equipment characterized by preparing the heights formed in the installation side of the piece of rocking support by being distributed in the feed direction.

[0015] If this invention is followed, since the heights formed in the installation side of the piece of rocking support by being distributed in the feed direction will be prepared, even when the recording paper is inserted in feed equipment with impulse force, it can prevent that heights demonstrate the function of a skid, catch the lower limit of the inserted recording paper certainly, and the recording paper enters the direction of the installation side of the piece of rocking support. Therefore, when the recording paper is inserted in feed equipment with impulse force, the function which carries out separation feeding of every one sheet of recording paper certainly can be strengthened further.

[0016] Moreover, this invention is a recording device containing said any one feed equipment and the print head printed on the recording paper by the feed direction downstream rather than the piece of support of the bottom plate of feed equipment.

[0017] If this invention is followed, since it has feed equipment which can feed paper at a time to one sheet of recording paper certainly, a recording device will not generate the futility which spends two or more sheets of recording papers on coincidence, and prints them, when printing the recording paper.

[0018]

[Embodiment of the Invention] Drawing 1 is the sectional view simplifying and showing the configuration of the feed equipment 1 which is one gestalt of operation of this invention, drawing 2 R> 2 is the perspective view simplifying and showing the configuration of the recording device 2 equipped with the feed equipment 1 shown in drawing 1, and drawing 3 is the perspective view simplifying and showing the configuration of the feed equipment 1 shown in drawing 1. The background 4 which has the back face 3 set up by inclining caudad as feed equipment 1 becomes the downstream of the feed direction shown in the arrow mark 11, The support means 7 from a cartridge which supports the lower limit 6 of the recording paper 5 which is arranged near the lower part of the background 4 and is supported by the background 4 in a from cartridge, It is arranged rather than the support means 7 from a cartridge at the feed direction downstream, and the bottom plate 8 to which it shows the recording paper 5, and the maximum top face of the recording paper 5 on a back face 3 are contacted, and the feed roller 9 which feeds paper to the topmost recording paper is included.

[0019] The piece 14 of the 1st detail paper guide prolonged almost in parallel in a projection and an end section 12 side-edge side is formed in nothing and the end section 12 neighborhood from the back face 3 of the background 4 in the monotonous configuration made of synthetic resin, the background 4 counters near [other end 13] the background 4 at the piece 14 of the 1st detail paper guide, and the piece 15 of the 2nd detail paper guide is formed. The piece 14 of the 1st detail paper guide is fixed and formed in a back face 3. The piece 15 of the 2nd recording paper support is formed in the direction shown in the arrow mark 16 movable, and can change and set up a guidance location according to the dimension of the recording paper.

[0020] The support means 7 from a cartridge is formed in the space formed of the 1st notch 17 formed in the feed direction downstream of the background 4, and the 2nd notch 18 which stands in a row in the 1st

notch 17, and is formed in the feed direction upstream of a bottom plate 8. The piece support shaft 40 of support which has the axis 23 perpendicular to the feed direction is formed in the feed direction downstream of the end face which counters in the direction perpendicular to the feed direction of the bottom plate 8 which forms the 2nd notch 18.

[0021] Moreover, as for the support means 7 from a cartridge, the feed direction downstream edge 21 is supported by the bottom plate 8 possible [an angular displacement] with the piece support shaft 40 of support at the circumference of the axis 23 perpendicular to the feed direction. The piece 24 of rocking support to which the feed direction upstream edge 22 exists back rather than the back face 3 of the background 4, The other spring force is given up to the feed direction upstream edge 22 of the piece 24 of rocking support, and the spring 26 which makes the feed direction upstream edge 22 of the piece 24 of rocking support contact the attaching part 25 formed in the feed direction upstream end face of the background 4 which forms the 1st notch 17 is included.

[0022] The piece 24 of rocking support is a product made of synthetic resin, it has the installation side 27 in which the lower limit 6 of the recording paper is laid, and it is in the condition to which the feed direction upstream edge 22 contacted said attaching part 25, and the installation side 27 of the piece 24 of rocking support and the back face 3 of the background make an include angle theta 1. An include angle theta 1 is set up in quest of the suitable include angle into which feed equipment 1 can feed the recording paper according to the dimension of the recording paper made applicable to feeding, especially the range of thickness by experiment. It is attached in the field 31 which faces the piece 24 of rocking support of the spring supporter material 30 of a spring 26 with which 28, on the other hand, supported the opposite side 32 of the installation side 27 in the feed direction upstream edge 22 of the piece 24 of rocking support, and another side 29 of a spring 26 was formed behind the bottom plate 8. All the configurations of the support means 7 from a cartridge which opens spacing perpendicularly to the feed direction and is arranged three with the gestalt of this operation are the same.

[0023] A bottom plate 8 has the slideway 36 to which it shows the recording paper fed toward nothing and the feed direction downstream in the monotonous configuration made of synthetic resin, and the slideway 36 of a bottom plate 8 and the back face 3 of the background 4 make an include angle theta 2. Said include angle theta 1 is larger than theta 2, and theta 2 is a larger obtuse angle than 90 include angles, and is $\theta_1 > \theta_2 > 90$ degree.

[0024] The feed roller 9 is attached in the roller revolving shaft 41, and the roller revolving shaft 41 is formed in the circumference of an axis perpendicular to the feed direction free [rotation] by the below-mentioned arms 51 and 52 at feed equipment 1. It connects with the driving sources 44, such as a motor, the rotation driving force of a driving source 44 is transmitted to the roller revolving shaft 41, and the roller revolving shaft 41 and the feed roller 9 rotate the other end 43 of the roller revolving shaft 41 in the arrow mark 45 directions.

[0025] Bearing 46 and 47 is formed in the opposite side 37 of the slideway 36 of a bottom plate 8 at the end section 38 and the other end 39. The arm support shaft 48 which has an axis perpendicular to the feed direction inserts in bearing 46 and 47, and is established, the circumference of an axis perpendicular to the feed direction is equipped with one side of arms 51 and 52 possible [an angular displacement] at the end section 49 and the other end 50 of the arm support shaft 48, and the end section 42 and the other end 43 of the roller revolving shaft 41 are supported by another side of arms 51 and 52 free [rotation].

[0026] The angular displacement of the arms 51 and 52 can be carried out to the circumference of an axis perpendicular to the feed direction of the arm support shaft 48 toward the back-face 3 side of the background 4 with the self-weight of the feed roller 9, the roller revolving shaft 41, a driving source 44, etc. When arms 51 and 52 carry out an angular displacement, the feed roller 9 can contact the maximum top face of the recording paper laid in the back face 3. If the feed roller 9 rotates the roller revolving shaft 41 in the arrow mark 45 directions by the driving source 44 where the maximum top face of the recording paper laid in the back face 3 is contacted, with the roller revolving shaft 41, the feed roller 9 will rotate and the recording paper will be fed.

[0027] Rather than the bottom plate 8 of feed equipment 1, the recording device 2 equipped with feed equipment 1 is arranged under the print head 61 printed on the recording paper by the feed direction downstream, and the print head, and contains the pivotable platen 62 in the arrow mark 67 directions. The guidance shaft 63 established at right angles to the feed direction is equipped with a print head 61 movable in the arrow mark 66 directions, it moves in accordance with the guidance shaft 63 by the timing belt 64, and is printed and recorded on the recording paper 65 to which paper was fed between the print head 61 and the platen 62 according to printing information.

[0028] Drawing 4 is drawing showing the outline of separation feeding of the recording paper 73 by the

feed equipment 81 using an include-angle separation method. The recording paper 73 is laid in the back face 72 of the background 71, and the 1st recording paper 79 of the outermost layer is fed along with the slideway 76 of a bottom plate 75 with the feed roller 74. In an include-angle separation method, separation feeding of the recording paper is carried out as follows. Here, in each recording paper laid in the back face 72 of the background 71, the front face and the field of a call and the opposite side of the recording paper are called a rear face for the field which attends the feed roller 74 side. When the feed roller 74 is rotated in the direction of the arrow mark 77, frictional force produced between the feed roller 74 and the front face of the 1st recording paper 79 is set to A. Frictional force between the front face of the 2nd recording paper and the rear face of the 1st recording paper 79 is set to B. When the recording paper is fed in the direction of a bottom plate 75 from the back face 72 of the background 71 by rotation of the feed roller 74, by it, the force (it is henceforth called a deterrent) in which the slideway 76 of a bottom plate 75 inhibits feeding of the recording paper in the recording paper lower limit side 78 is set to C.

[0029] In order to feed a form $A > B+C$ -- (1)

It comes out and a certain thing is required. Moreover, in order to make it not feed two or more sheets of record forms at once, when frictional force of the rear face of the 2nd recording paper and the front face of the 3rd recording paper is set to D, it is. $B < C+D$ -- (2)

It comes out and a certain thing is required.

[0030] The frictional force between the feed roller 74 and the recording paper and the frictional force between the recording papers are influenced of the thickness of the recording paper and an environmental condition, especially humidity. A deterrent is decided by the include angle theta which the slideway 76 of a bottom plate 75 and the back face 72 of the background 71 make. If an include angle theta is large, a deterrent will become small, and a deterrent will become large if an include angle theta is small. For example, since the deterrent is large when thickness of the recording paper is thick like a postcard, and an include angle theta is small, a postcard cannot be fed. Moreover, since the deterrent is too small when an include angle theta is large in the case of the recording paper with conversely thin thickness, two or more sheets of recording papers will be fed at once. Therefore, it is necessary to experiment in the suitable include angle theta for the range of the thickness of the recording paper which feed equipment makes applicable to feeding, and to ask beforehand.

[0031] The include angle theta of the slideway 76 of a bottom plate 75 and the back face 72 of the background 71 to make is set as the magnitude of the proper range called for experimentally, and they are the relational expression between the aforementioned deterrent and frictional force, and $A > B+C$: It reaches. When $B < C+D$ is satisfied, one sheet of recording paper is separated and fed at a time.

[0032] Drawing 5 is drawing in which two or more sheets of recording papers 82 of an outer layer show the condition of having entered even into the slideway 76 of a bottom plate 75 across the boundary of the background 71 and a bottom plate 75 among the recording papers 73 inserted in feed equipment 81. When the user of feed equipment 81 inserts the recording paper 73 in feed equipment 81 with impulse force, two or more sheets of recording papers 82 by the side of an outer layer may enter even into the slideway 76 of a bottom plate 75 across the boundary of the background 71 and a bottom plate 75 among the recording papers 73 which carried out the laminating. Since it has already turned [lower limit / of two or more sheets of recording papers 82 which entered even into the slideway 76 of a bottom plate 75] to the feed direction downstream in contact with the slideway 76 at this time, the deterrent of a slideway 76 does not work. Therefore, when said feed roller 74 is rotated and separation feeding of the recording paper 73 is started, two or more sheets of recording papers 82 with which the lower limit entered into the slideway 76 of a bottom plate 75 are fed into coincidence with the feed roller 74.

[0033] Drawing 6 is the sectional view showing the condition that the recording paper 5 was inserted in feed equipment 1, and impulse force was applied. When the recording paper 5 is inserted in feed equipment 1 with impulse force by the user of feed equipment 1, the installation side 27 of the piece 24 of rocking support which contacts the 6th page of the lower limit of the inserted recording paper 5 catches the inserted recording paper 5. At this time, the spring 26 which supports the feed direction upstream edge 22 of the piece 24 of rocking support carries out a compression set according to the impulse force when inserting the recording paper 5, and the piece 24 of rocking support absorbs impulse force in case an angular displacement is carried out to the circumference of the axis 23 perpendicular to the feed direction and the recording paper 5 is inserted in feed equipment 1. Therefore, the lower limit 6 of the recording paper inserted in feed equipment 1 does not enter the installation side 27 of the piece 24 of rocking support. When the piece 24 of rocking support carries out an angular displacement to the circumference of the axis 23 perpendicular to the feed direction, moreover, the include angle theta 3 of the installation side

27 of the piece 24 of rocking support, and the back face 3 of the background 4 to make Before the recording paper 5 is inserted, the installation side 27 of the piece 24 of rocking support becomes smaller than the back face 3 of the background 4, and the include angle theta 1 to make in the state of the maintenance which contacted the attaching part 25 in the feed direction upstream edge 22. Therefore, since the deterrent to recording paper feeding of the installation side 27 of the piece 24 of rocking support becomes large after the recording paper 5 was inserted in feed equipment 1 and the piece 24 of rocking support has carried out the angular displacement, the lower limit 6 of the recording paper 5 inserted in feed equipment 1 does not enter the installation side 27 of the piece 24 of rocking support.

[0034] Furthermore, if the impulse force when inserting the recording paper 5 in feed equipment 1 is released, the feed direction upstream edge 22 of the piece 24 of rocking support will be supported, and the spring 26 which was carrying out the compression set will return to the configuration before causing a compression set. In connection with returning to the configuration before a spring 26 causes a compression set, the piece 24 of rocking support is in the condition which put the recording paper 5 by which the laminating was carried out, and returns to the location where the installation side 27 contacts an attaching part 25 in the feed direction upstream edge 22 of the piece 24 of rocking support. The feed direction upstream edge 22 of the piece 24 of rocking support is in the condition held in the location which contacts an attaching part 25, and the include angle theta 1 of the installation side 27 of the piece 24 of rocking support and the back face 3 of the background 4 to make is a suitable include angle which asked carrying out separation feeding for one sheet of recording paper at a time beforehand experimentally. Therefore, since the piece 24 of rocking support is held in the suitable location for separation feeding when starting separation feeding of the recording paper, separation feeding of every one sheet of recording paper can be carried out certainly.

[0035] Drawing 7 is the perspective view by which heights 88 were formed in the installation side 87 of the piece 86 of rocking support which is the 2nd gestalt of operation of this invention, drawing 8 is the side elevation of drawing 7, and drawing 9 is drawing showing the condition of recording paper feeding of drawing 8. With this operation gestalt, the heights 88 which are distributed in the feed direction and formed in the center of a direction perpendicular to the feed direction of the installation side 87 of the piece 86 of rocking support serrate are formed. Heights 88 can prevent that heights 88 demonstrate the function of a skid, catch the lower limit of the inserted recording paper 91, and the lower limit of the recording paper 91 enters to the installation side 87 of the piece 86 of rocking support, even when the recording paper 91 is inserted in feed equipment 89 with impulse force. Moreover, when the recording paper 92 of the 1st recording paper outermost layer is fed, feeding is inhibited by the heights 88 prepared in the installation side 87, lower limit 92a of the 1st recording paper 92 once curves by them, but if the force which feeds the recording paper exceeds a deterrent, lower limit 92b of the 1st recording paper 92 will be fed towards the feed direction downstream exceeding the serrate heights 88. Since the lower limit of the recording paper 91 is certainly caught by the heights 88 of the installation side 87 when the recording paper 91 is inserted in feed equipment 89 by forming heights 88 in the installation side 87 of the piece 86 of rocking support, the function which carries out separation feeding of every one sheet of recording paper certainly can be demonstrated still more strongly.

[0036] In this invention, even if it is the piece of rocking support which does not have heights in an installation side, when inserting the recording paper in feed equipment, the effectiveness of preventing the lower limit of the recording paper entering the installation side of the piece of rocking support is demonstrated. Therefore, it is not necessary to pay all the deterrents only by the heights prepared in the installation side of the piece of rocking support, and even if it makes low in the height which is extent which does not damage the lower limit of the recording paper the height in which heights project from an installation side, the deterrent of an installation side can be improved by the skid function of heights.

[0037] As stated above, with the 1st and 2nd gestalten of operation of this invention, the piece of rocking support may be attached with the shock absorber which used rubber etc., without being limited to this, although the piece of rocking support is supported by means of a spring. Moreover, without being limited to this, although three support means from a cartridge are established, the number of the support means from a cartridge may be two or less, and may be four or more. Moreover, without being limited to this, although distributed and prepared in the feed direction of the recording paper, the heights formed in the installation side of the piece of rocking support may be prepared in the center of a direction perpendicular to the feed direction of the installation side of the piece of rocking support all over the installation side of the piece of rocking support, and may be locally prepared in it. Moreover, the heights formed in the installation side of the piece of rocking support may be other configurations, without being limited to this, although it is serrate.

[0038]

[Effect of the Invention] Since the support means from a cartridge which supports the lower limit of the recording paper supported by the background in a from cartridge is established near the lower part of the background according to this invention, even when a user inserts the recording paper in feed equipment with impulse force, impulse force when the supporter material from a cartridge inserts the recording paper can be absorbed. Therefore, since the impulse force when inserting the recording paper in feed equipment is eased by the supporter material from a cartridge, when the recording paper can prevent entering the direction of a bottom plate and feeds the recording paper, two or more sheets are not fed into coincidence.

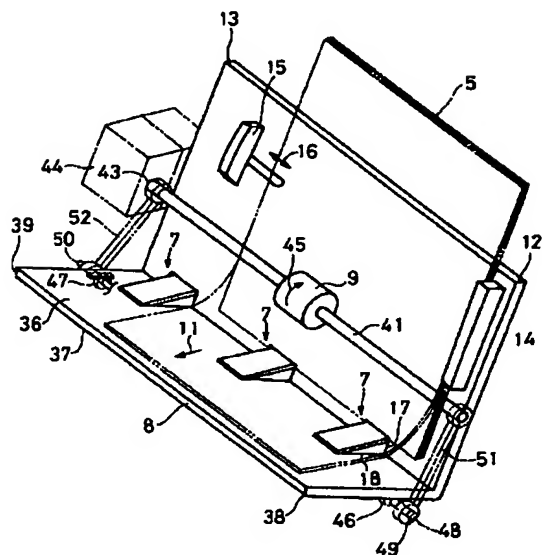
[0039] Moreover, when the recording paper is inserted in feed equipment with impulse force, the angular displacement of the piece of rocking support carries out, and it absorbs impulse force, and since the support means from a cartridge contains the piece of rocking support and the spring in which an angular displacement is possible, according to this invention, it is held in the location where the include angle of the installation side of the piece of rocking support and the back face of the background to make becomes θ_1 and which defines beforehand, putting the recording paper, where impulse force is removed. Therefore, since the include angle of the installation side of the piece of rocking support and the back face of the background to make is maintained at the suitable include angle θ_1 defined beforehand when the recording paper does not enter the direction of the installation side of the piece of rocking support according to the impulse force at the time of insertion when inserting the recording paper in feed equipment, and starting separation feeding of the recording paper, one sheet can carry out separation feeding at a time certainly in the recording paper. Moreover, since the include angle θ_1 of the installation side of the piece of rocking support and the back face of the background to make is larger than the include angle θ_2 of the back face of the background, and the slideway of a bottom plate to make, the recording paper with which separation feeding was started does not have feeding inhibited by the slideway of a bottom plate, and is fed smoothly.

[0040] Moreover, according to this invention, according to the dimension of the recording paper fed, the number of the pieces of rocking support which support the lower limit of the recording paper differs. Therefore, the force in which the installation side of the piece of rocking support inhibits feeding of the recording paper in contact with the lower limit of the recording paper will be adjusted by the number of the pieces of rocking support which contact the lower limit of the recording paper, and separation feeding of the recording paper is smoothly performed by the contact to the piece of rocking support of the number according to the dimension of the recording paper, and a recording paper lower limit.

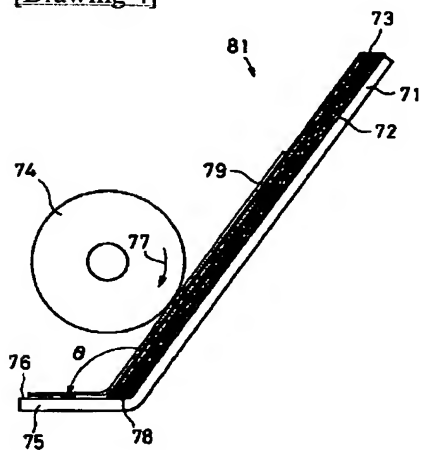
[0041] Moreover, since the heights formed in the installation side of the piece of rocking support by being distributed in the feed direction are prepared according to this invention, even when the recording paper is inserted in feed equipment with impulse force, heights demonstrate the function of a skid, the lower limit of the inserted recording paper is caught certainly, and the recording paper can prevent entering the direction of the installation side of the piece of rocking support. Therefore, when the recording paper is inserted in feed equipment with impulse force, the function which carries out separation feeding of every one sheet of recording paper certainly can be strengthened further.

[0042] Moreover, according to this invention, since it has feed equipment which can feed paper at a time to one sheet of recording paper certainly, a recording device does not generate the futility which spends two or more sheets of recording papers on coincidence, and prints them, when printing the recording paper.

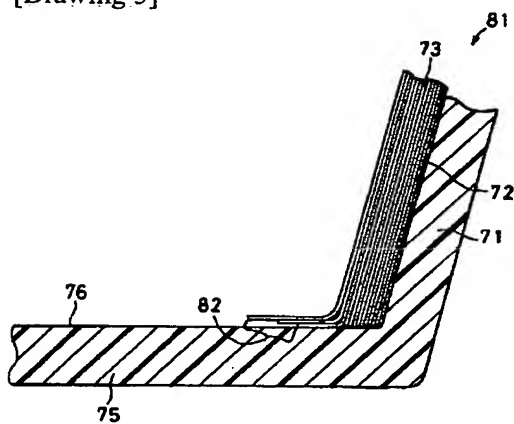
[Translation done.]



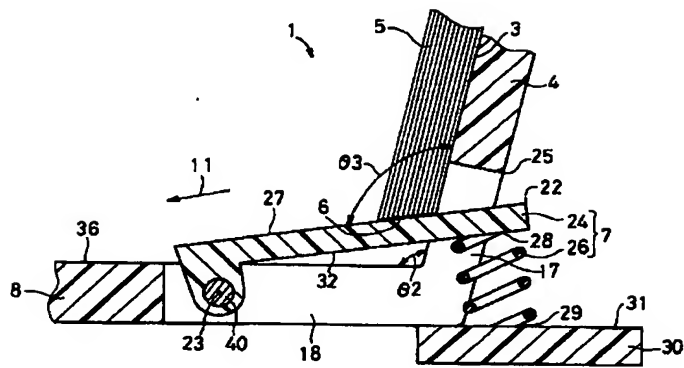
[Drawing 4]



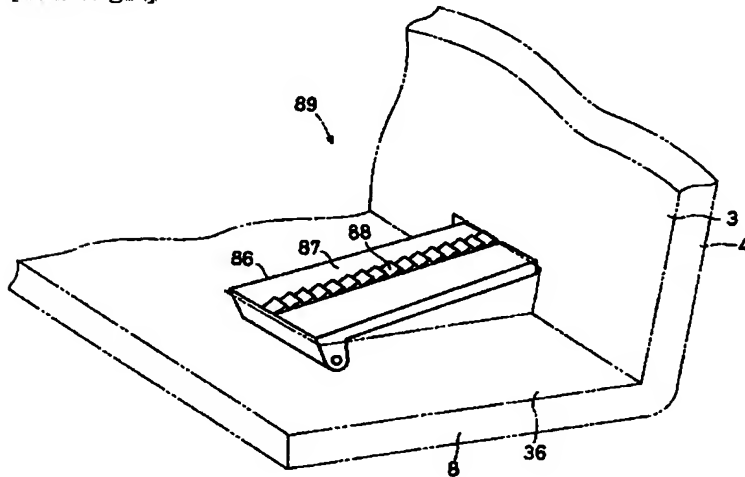
[Drawing 5]



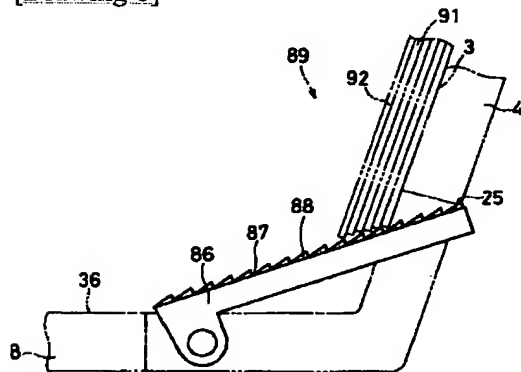
[Drawing 6]



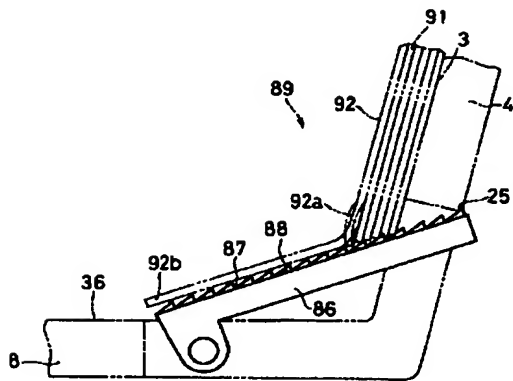
[Drawing_7]



[Drawing 8]



[Drawing 9]



[Translation done.]

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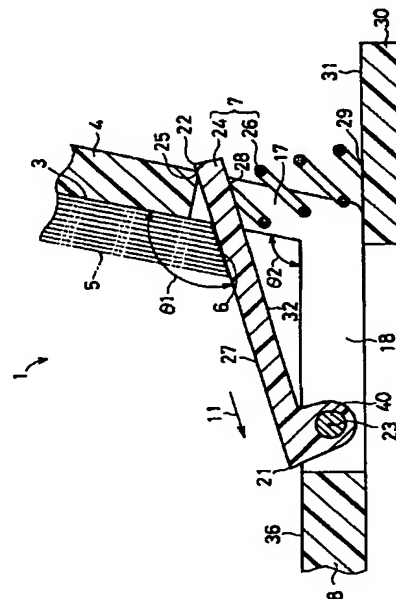
KB17 LA04 LA15 LD04 MC07

(54) 【発明の名称】 給紙装置

(57) 【要約】

【課題】 記録紙が衝撃力をともなって給紙装置に挿入された場合でも、記録紙を1枚ずつ確実に分離送給することができる。

【解決手段】 給紙装置1の背板4の下部付近に、記録紙5の下端6を弾発的に支持する弾発支持手段7を設ける。弾発支持手段7は、揺動支持片24とばね26とを含む。揺動支持片24は、記録紙5が給紙装置1に挿入されたとき、給紙方向に垂直な軸線23まわりに角変位して記録紙挿入の衝撃力を吸収する。衝撃力が解放されたとき、揺動支持片24は、上方に向うばね力によって予め定める保持部25に当接し、揺動支持片24の載置面27と背板4の支持面3とのなす角度が、給紙に好適な角度 $\theta 1$ に保持される。



【特許請求の範囲】

【請求項 1】 給紙方向下流側になるにつれて下方に傾斜して立設される支持面を有する背板と、背板の下部付近に配置され、背板によって支持される記録紙の下端を弾発的に支持する弾発支持手段と、弾発支持手段よりも給紙方向下流側に配置され、記録紙を案内する底板と、支持面上の記録紙の最上面に接触し、最上部の記録紙を給紙する給紙ローラとを含むことを特徴とする給紙装置。

【請求項 2】 弾発支持手段は、給紙方向下流側端部が給紙方向に垂直な軸線まわりに角変位可能に支持され、給紙方向上流側端部が背板の支持面よりも背後に存在する揺動支持片と、揺動支持片の前記上流側端部に上方に向うばね力を与え、積層された記録紙の静置状態で揺動支持片の前記上流側端部を予め定める位置に当接させるばねとを含み、積層された記録紙の静置状態で揺動支持片の載置面と背板の支持面とのなす角度 $\theta 1$ が、背板の支持面と底板の案内面とのなす角度 $\theta 2$ よりも大きい、 $\theta 1 > \theta 2$ であることを特徴とする請求項 1 に記載の給紙装置。

【請求項 3】 複数の揺動支持片が、給紙方向に対して垂直方向に間隔をあけて配置されることを特徴とする請求項 1 または 2 に記載の給紙装置。

【請求項 4】 揺動支持片の載置面に給紙方向に分布して形成される凸部が設けられることを特徴とする請求項 1～3 のいずれかに記載の給紙装置。

【請求項 5】 請求項 1～4 のいずれか 1 つに記載の給紙装置と、給紙装置の底板よりも給紙方向下流側で記録紙に印字する印字ヘッドとを含む記録装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、通信装置および情報処理装置などとともに使用される記録装置に装備される記録紙を送給するための給紙装置に関する。

【0002】

【従来の技術】通信装置および情報処理装置などに使用される記録装置に装備される給紙装置には、用紙を 1 枚ずつ送給するための方法が種々用いられている。たとえば、記録紙が載置されるカセットの底面をばねなどで押し上げて記録紙の給紙方向先端側の両端を爪で押さえ、載置された記録紙を給紙ローラで給紙方向に押し出し、複数枚載置された記録紙のうち最外層の 1 枚が、爪の阻止力を超えたときに給紙される方法。また、給紙ローラと給紙ローラに当接されるゴムなどの摩擦係数の大きい阻止部材との間に記録紙を送給し、給紙ローラを給紙方向に回転して、給紙ローラ側の 1 枚のみが阻止部材の阻

止力に打ち勝ったときに給紙される方法。また、給紙される用紙の表面側に給紙方向に回転するローラを配し、複数枚載置された記録紙の裏面側に給紙方向と反対方向に回転するローラを配し、2 枚目以下の記録紙は給紙方向と反対方向に回転するローラによって推し戻され、給紙される記録紙の表面側の 1 枚のみが給紙される方法。また、真空吸引により、給紙される側の 1 枚目のみを真空吸引力で持ち上げ、2 枚目以下の記録紙は反対側から真空吸引装置で吸引する力で給紙を阻止することにより、1 枚目のみ給紙する方法などである。

【0003】前述の給紙方法に対して、記録紙を載置して支持する支持面を有する背板と、背板の給紙方向下流側に予め定める角度を有して配置され記録紙を分離する底板とによって、記録紙を分離送給する角度分離方法を用いた給紙装置は、簡単な構造で記録紙の分離送給を実現することができる。また、簡単な構造であるけれども、記録紙の使用可能な厚みの範囲が広く、装置の所要面積が小さいので、給紙装置を搭載する記録装置、ひいては記録装置を使用する通信装置および情報処理装置の床面積を小さくすることができる。さらに、記録紙を 1 枚分離して給紙を開始した後は、たとえば記録紙を給紙する給紙ローラを半月形にするなどして、給紙が開始された記録紙に給紙ローラが接触しないようにして負荷を与えない構成にすれば、印刷時に円滑な給紙をすることができる利点があり、角度分離方法は多用されるに至っている。

【0004】角度分離方法は、利点のある方法であるけれども、厚みが広い範囲にわたる記録紙を 1 枚ずつ確実に送給するという点においては、必ずしも万全ではなく、その対策のための先行技術として、たとえば特開平 9-12168 号公報などが開示されている。この先行技術では、角度を固定した底板（先行技術では分離板とも呼ぶ）に加えて、用紙に対して前記分離板よりも鋭角に当接する弾性部材からなる補助分離板を設ける。補助分離板は、記録紙の給紙方向下流側では撓んで角度が大きくなって送給抵抗が小さくなり、給紙方向上流側ではあまり撓まずに角度が小さいままで送給抵抗が大きい。すなわち、補助分離板の撓みを利用して、種々の厚みの用紙に対しても分離と送給とを確実に行えるようにしている。

【0005】

【発明が解決しようとする課題】この先行技術には、以下の問題がある。給紙装置の使用者が、記録紙を給紙装置に挿入するとき、衝撃力をともなう記録紙を挿入すると、記録紙は背板と分離板との境界を越えて、挿入した記録紙のうち複数枚の下端が分離板の方に入り込むことがある。複数枚の記録紙の下端が分離板に入り込んだ状態で給紙を開始すると、既に分離板に入り込んだ複数枚の記録紙については、分離板が記録紙を 1 枚ずつ分離する機能を発揮できないので、複数枚を同時に送給する

現象が起こる。

【0006】先行技術の分離板および補助分離板による記録紙の分離送給は、記録紙が給紙装置に正常に挿入されたときに、記録紙の厚みが多岐にわたっても1枚ずつ、分離送給することができるものであり、使用者が給紙装置に記録紙を挿入したとき、分離板に複数枚の記録紙の下端が入り込んでしまうという異常な状態においては、記録紙を1枚ずつ分離送給することができない。

【0007】本発明は、記録紙が衝撃力をともなって給紙装置に挿入された場合でも、記録紙が挿入された直後から記録紙を1枚ずつ確実に分離送給することができる給紙装置およびそれを備える記録装置を提供することである。

【0008】

【課題を解決するための手段】本発明は、給紙方向下流側になるにつれて下方に傾斜して立設される支持面を有する背板と、背板の下部付近に配置され、背板によって支持される記録紙の下端を弾発的に支持する弾発支持手段と、弾発支持手段よりも給紙方向下流側に配置され、記録紙を案内する底板と、支持面上の記録紙の最上面に接触し、最上部の記録紙を給紙する給紙ローラとを含むことを特徴とする給紙装置である。

【0009】本発明に従えば、背板の下部付近に背板によって支持される記録紙の下端を弾発的に支持する弾発支持手段が設けられるので、使用者が衝撃力をともなって記録紙を給紙装置に挿入した場合でも、弾発支持部材が記録紙を挿入したときの衝撃力を吸収することができる。したがって、記録紙を給紙装置に挿入するときの衝撃力が、弾発支持部材によって緩和されるので、記録紙が底板の方まで入り込むことを防止でき、記録紙を送給するときに複数枚を同時に送給することがない。

【0010】また本発明は、弾発支持手段は、給紙方向下流側端部が給紙方向に垂直な軸線まわりに角変位可能に支持され、給紙方向上流側端部が背板の支持面よりも背後に存在する揺動支持片と、揺動支持片の前記上流側端部に上方に向うばね力を与え、積層された記録紙の静置状態で揺動支持片の前記上流側端部を予め定める位置に当接させるばねとを含み、積層された記録紙の静置状態で揺動支持片の載置面と背板の支持面とのなす角度 $\theta 1$ が、背板の支持面と底板の案内面とのなす角度 $\theta 2$ よりも大きい、 $\theta 1 > \theta 2$ であることを特徴とする給紙装置である。

【0011】本発明に従えば、弾発支持手段は、角変位可能な揺動支持片とばねを含むので、記録紙が給紙装置に衝撃力をともなって挿入されたとき、揺動支持片は角変位して衝撃力を吸収し、衝撃力が除かれた状態で記録紙を静置したまま揺動支持片の載置面と背板の支持面とのなす角度が、 $\theta 1$ となる予め定める位置に保持される。したがって、給紙装置に記録紙を挿入するとき、記録紙が挿入時の衝撃力によって揺動支持片の載置面の方

に入り込むことがなく、また、記録紙の分離送給を開始するとき、揺動支持片の載置面と背板の支持面とのなす角度が、予め定める好適な角度 $\theta 1$ に保たれるので、記録紙を1枚ずつ確実に分離送給することができる。また、揺動支持片の載置面と背板の支持面とのなす角度 $\theta 1$ は、背板の支持面と底板の案内面とのなす角度 $\theta 2$ よりも大きいので、分離送給の開始された記録紙は、底板の案内面によって送給を抑止されることがなく、円滑に送給される。

【0012】また本発明は、複数の揺動支持片が、給紙方向に対して垂直方向に間隔をあけて配置されることを特徴とする給紙装置である。

【0013】本発明に従えば、送給される記録紙の寸法に応じて、記録紙の下端を支持する揺動支持片の数が異なる。したがって、揺動支持片の載置面が記録紙の下端に当接して記録紙の送給を抑止する力が、記録紙の下端に当接する揺動支持片の数によって調整されることになり、記録紙の寸法に応じた数の揺動支持片と記録紙下端との当接によって、記録紙の分離送給が円滑に行われる。

【0014】また本発明は、揺動支持片の載置面に給紙方向に分布して形成される凸部が設けられることを特徴とする給紙装置である。

【0015】本発明に従えば、揺動支持片の載置面に給紙方向に分布して形成される凸部が設けられるので、記録紙が衝撃力をともなって給紙装置に挿入された場合でも、凸部が滑り止めの機能を発揮し、挿入された記録紙の下端を確実に受け止めて、記録紙が揺動支持片の載置面の方まで入り込むことを防止できる。したがって、記録紙が給紙装置に衝撃力をともなって挿入されたとき、記録紙を1枚ずつ確実に分離送給する機能を一層強化することができる。

【0016】また本発明は、前記いずれか1つの給紙装置と、給紙装置の底板の支持片よりも給紙方向下流側で記録紙に印字する印字ヘッドとを含む記録装置である。

【0017】本発明に従えば、記録装置は、記録紙を1枚ずつ確実に給紙することのできる給紙装置を備えるので、記録紙を印字する場合に複数枚の記録紙を同時に費やして印字する無駄を発生することがない。

【0018】

【発明の実施の形態】図1は本発明の実施の1形態である給紙装置1の構成を簡略化して示す断面図であり、図2は図1に示す給紙装置1を備えた記録装置2の構成を簡略化して示す斜視図であり、図3は図1に示す給紙装置1の構成を簡略化して示す斜視図である。給紙装置1は、矢符11に示す給紙方向の下流側になるにつれて下方に傾斜して立設される支持面3を有する背板4と、背板4の下部付近に配置され、背板4によって支持される記録紙5の下端6を弾発的に支持する弾発支持手段7と、弾発支持手段7よりも給紙方向下流側に配置され、

記録紙5を案内する底板8と、支持面3上の記録紙5の最上面に接触し、最上部の記録紙を給紙する給紙ローラ9を含む。

【0019】背板4は、合成樹脂製の平板形状をなし、一端部12付近に背板4の支持面3から突出し、一端部12側端面にほぼ平行に延びる第1記録紙案内片14が設けられ、背板4の他端部13付近には、第1記録紙案内片14に対向して第2記録紙案内片15が設けられる。第1記録紙案内片14は、支持面3に固定して設けられる。第2記録紙支持片15は、矢符16に示す方向に可動に設けられ、記録紙の寸法に応じて案内位置を変更して設定することができる。

【0020】弾発支持手段7は、背板4の給紙方向下流側に形成される第1切欠き17と、第1切欠き17に連なって底板8の給紙方向上流側に形成される第2切欠き18とによって形成される空間に設けられる。第2切欠き18を形成する底板8の給紙方向に垂直な方向に対向する端面の給紙方向下流側には、給紙方向に垂直な軸線23を有する支持片支持軸40が設けられる。

【0021】また、弾発支持手段7は、給紙方向下流側端部21が支持片支持軸40によって給紙方向に垂直な軸線23まわりに角変位可能に底板8に支持され、給紙方向上流側端部22が背板4の支持面3よりも背後に存在する揺動支持片24と、揺動支持片24の給紙方向上流側端部22に上方に向うばね力を与え、揺動支持片24の給紙方向上流側端部22を、第1切欠き17を形成する背板4の給紙方向上流側端面に形成される保持部25に当接させるばね26を含む。

【0022】揺動支持片24は、合成樹脂製であり、記録紙の下端6を載置する載置面27を有し、給紙方向上流側端部22が前記保持部25に当接した状態で、揺動支持片24の載置面27と背板の支持面3とは、角度 θ 1をなす。角度 θ 1は、給紙装置1が送給対象とする記録紙の寸法、特に厚みの範囲に応じて、記録紙を送給することができる好適な角度を実験により求めて設定したものである。ばね26の一方28は、揺動支持片24の給紙方向上流側端部22において、載置面27の反対面32を支持し、ばね26の他方29は、底板8の背後に設けられたばね支持部材30の揺動支持片24を臨む面31に取付けられる。本実施の形態では、給紙方向に対して垂直方向に間隔をあけて3つ配置される弾発支持手段7の構成は、すべて同一である。

【0023】底板8は、合成樹脂製の平板形状をなし、給紙方向下流側に向かって送給される記録紙を案内する案内面36を有し、底板8の案内面36と背板4の支持面3とは、角度 θ 2をなす。前記角度 θ 1は、 θ 2よりも大きく、 θ 2は角度90度よりも大きい鈍角であり、 θ 1> θ 2>90度である。

【0024】給紙ローラ9はローラ回転軸41に取付けられ、ローラ回転軸41は、後述のアーム51、52に

よって給紙方向に垂直な軸線まわりに回転自在に給紙装置1に設けられる。ローラ回転軸41の他端部43は、電動機などの駆動源44に接続され、駆動源44の回転駆動力がローラ回転軸41に伝達されて、ローラ回転軸41および給紙ローラ9が、矢符45方向に回転する。

【0025】底板8の案内面36の反対面37には、一端部38と他端部39とに軸受46、47が設けられる。給紙方向に垂直な軸線を有するアーム支持軸48が、軸受46、47に挿通して設けられ、アーム支持軸48の一端部49および他端部50には、給紙方向に垂直な軸線まわりに角変位可能にアーム51、52の一方が装着され、アーム51、52の他方には、ローラ回転軸41の一端部42と他端部43とが回転自在に支持される。

【0026】アーム51、52は、給紙ローラ9、ローラ回転軸41および駆動源44などの自重によって、アーム支持軸48の給紙方向に垂直な軸線まわりに背板4の支持面3側に向かって角変位することができる。アーム51、52が角変位することによって、給紙ローラ9は支持面3に載置された記録紙の最上面に当接することができる。給紙ローラ9が、支持面3に載置された記録紙の最上面に当接した状態で、駆動源44によってローラ回転軸41を矢符45方向に回転すると、ローラ回転軸41とともに給紙ローラ9が、回転して記録紙が送給される。

【0027】給紙装置1を備えた記録装置2は、給紙装置1の底板8よりも給紙方向下流側で記録紙に印字する印字ヘッド61と、印字ヘッドの下方に配置され矢符67方向に回転可能なブラテン62を含む。印字ヘッド61は、給紙方向に垂直に設けられた案内軸63に矢符66方向に可動に装着され、タイミングベルト64によって案内軸63に沿って移動し、印字ヘッド61とブラテン62との間に給紙された記録紙65に、印字情報に応じて印字し記録する。

【0028】図4は、角度分離法を利用した給紙装置81による記録紙73の分離送給の概要を示す図である。背板71の支持面72には記録紙73が載置され、最外層の1枚目の記録紙79が、給紙ローラ74によって底板75の案内面76に沿って送給される。角度分離法では、次のようにして記録紙が分離送給される。ここで、背板71の支持面72に載置された各記録紙において、給紙ローラ74側に臨む面を記録紙の表面と呼び、その反対側の面を裏面と呼ぶ。給紙ローラ74を矢符77の方向に回転したとき、給紙ローラ74と1枚目の記録紙79の表面との間に生じる摩擦力をAとする。2枚目の記録紙の表面と1枚目の記録紙79の裏面との間の摩擦力をBとする。給紙ローラ74の回転によって、記録紙が背板71の支持面72から底板75の方向に送給されたとき、底板75の案内面76が記録紙下端78にあたって記録紙の送給を抑止する力（以後、抑止力と呼

ぶ)をCとする。

$$A > B + C$$

であることが必要である。また、複数枚の記録用紙を一度に送給されることがないようにするには、2枚目の記

$$B < C + D$$

であることが必要である。

【0030】給紙ローラ74と記録紙との間の摩擦力および記録紙と記録紙との間の摩擦力は、記録紙の厚みおよび環境条件特に湿度の影響を受ける。抑止力は、底板75の案内面76と背板71の支持面72とがなす角度 θ によって決まる。角度 θ が大きいと抑止力は小さくなり、角度 θ が小さいと抑止力は大きくなる。たとえば、記録紙が葉書のように厚みの厚いものであるとき、角度 θ が小さいと抑止力が大きいので、葉書を送給することができない。また、逆に厚みの薄い記録紙の場合は、角度 θ が大きいと抑止力が小さすぎるので、複数枚の記録紙を一度に送給してしまうことになる。したがって、給紙装置が送給対象とする記録紙の厚みの範囲に好適の角度 θ を、実験して予め求めておく必要がある。

【0031】底板75の案内面76と背板71の支持面72とがなす角度 θ が、実験的に求められた適正範囲の大きさに設定され、前記の抑止力と摩擦力との間の関係式、

$$A > B + C \quad \text{および} \quad B < C + D$$

が満足されるとき、記録紙は1枚ずつ分離して送給される。

【0032】図5は、給紙装置81に挿入された記録紙73のうち外層の複数枚の記録紙82が、背板71と底板75との境界を越えて、底板75の案内面76にまで入り込んだ状態を示す図である。給紙装置81の使用者が衝撃力をともなって記録紙73を給紙装置81に挿入したとき、積層した記録紙73のうち外層側の複数枚の記録紙82が、背板71と底板75との境界を越えて、底板75の案内面76にまで入り込むことがある。このとき、底板75の案内面76にまで入り込んだ複数枚の記録紙82の下端は、すでに案内面76と当接することがなく、給紙方向下流側に向いているので、案内面76の抑止力が働かない。したがって、前記給紙ローラ74を回転して記録紙73の分離送給を開始したとき、底板75の案内面76に下端が入り込んだ複数枚の記録紙82は、給紙ローラ74によって同時に送給される。

【0033】図6は、給紙装置1に記録紙5が挿入され、衝撃力が加えられた状態を示す断面図である。給紙装置1の使用者によって、記録紙5が衝撃力をともなって給紙装置1に挿入されたとき、挿入された記録紙5の下端6面と当接する揺動支持片24の載置面27が、挿入された記録紙5を受け止める。このとき、揺動支持片24の給紙方向上流側端部22を支持するばね26が、記録紙5を挿入するときの衝撃力に応じて圧縮変形し、揺動支持片24は給紙方向に垂直な軸線23まわりに角

【0029】用紙が送給されるためには、

… (1)

記録紙の裏面と3枚目の記録紙の表面との摩擦力をDとすると、

… (2)

変位して記録紙5が給紙装置1に挿入される時の衝撃力を吸収する。したがって、給紙装置1に挿入される記録紙の下端6が、揺動支持片24の載置面27に入り込むことがない。また、揺動支持片24が給紙方向に垂直な軸線23まわりに角変位したときに、揺動支持片24の載置面27と背板4の支持面3とのなす角度 θ 3は、記録紙5が挿入される前に揺動支持片24の載置面27が、給紙方向上流側端部22において保持部25に当接した保持状態で、背板4の支持面3となす角度 θ 1よりも小さくなる。したがって、記録紙5が給紙装置1に挿入されて、揺動支持片24が角変位した状態で、揺動支持片24の載置面27の記録紙送給に対する抑止力が大きくなるので、給紙装置1に挿入される記録紙5の下端6が揺動支持片24の載置面27に入り込むことがない。

【0034】さらに、記録紙5を給紙装置1に挿入したときの衝撃力が解放されると、揺動支持片24の給紙方向上流側端部22を支持し、圧縮変形していたばね26は、圧縮変形を起こす前の形状に復帰する。ばね26が圧縮変形を起こす前の形状に復帰するのにともなって、揺動支持片24は、積層された記録紙5を静置した状態で、揺動支持片24の給紙方向上流側端部22において、載置面27が保持部25に当接する位置まで復帰する。揺動支持片24の給紙方向上流側端部22が、保持部25に当接する位置に保持された状態で、揺動支持片24の載置面27と背板4の支持面3とのなす角度 θ 1は、記録紙を1枚ずつ分離送給するのに実験的に求められた好適な角度である。したがって、記録紙の分離送給を開始するとき、揺動支持片24は分離送給にとって好適な位置に保持されているので、記録紙を1枚ずつ確実に分離送給することができる。

【0035】図7は、本発明の実施の第2の形態である揺動支持片86の載置面87に凸部88が設けられた斜視図であり、図8は図7の側面図であり、図9は図8の記録紙送給の状態を示す図である。本実施形態では、揺動支持片86の載置面87の給紙方向に垂直な方向の中央に、給紙方向に分布して鋸歯状に形成される凸部88が設けられる。凸部88は、記録紙91が衝撃力をともなって給紙装置89に挿入された場合でも、凸部88が滑り止めの機能を発揮し、挿入された記録紙91の下端を受け止めて、記録紙91の下端が揺動支持片86の載置面87まで入り込むことを防止できる。また、記録紙最外層1枚目の記録紙92が送給されるとき、載置面87に設けられた凸部88によって送給が抑止されて、1枚目の記録紙92の下端92aは一旦湾曲するが、記録

紙を送給する力が抑止力を超えると、1枚目の記録紙92の下端92bは鋸歯状の凸部88を越えて、給紙方向下流側に向けて送給される。揺動支持片86の載置面87に凸部88を設けることによって、記録紙91を給紙装置89に挿入したとき、記録紙91の下端が載置面87の凸部88によって確実に受止められるので、記録紙を1枚ずつ確実に分離送給する機能を一層強く発揮することができる。

【0036】本発明では、載置面に凸部を有しない揺動支持片であっても、給紙装置に記録紙を挿入するとき、記録紙の下端が揺動支持片の載置面に入り込むことを防止する効果が発揮される。したがって、揺動支持片の載置面に設ける凸部だけで抑止力のすべてを負担する必要がなく、凸部が載置面から突出する高さを、記録紙の下端を傷めることがない程度の高さに低くしても、凸部の滑り止め機能によって載置面の抑止力を向上することができる。

【0037】以上述べたように、本発明の実施の第1および第2形態では、揺動支持片はばねで支持されているけれども、これに限定されることなく、揺動支持片はゴムなどをを用いた緩衝器で取付けられてもよい。また、弾発支持手段は3つ設けられているけれども、これに限定されることなく、弾発支持手段の数は、2つ以下であってもよく、また4つ以上であってもよい。また、揺動支持片の載置面に形成される凸部は、揺動支持片の載置面の給紙方向に垂直な方向の中央に、記録紙の給紙方向に分布して設けられているけれども、これに限定されることなく、揺動支持片の載置面の全面に設けられてもよく、また局部的に設けられてもよい。また、揺動支持片の載置面に形成される凸部は、鋸歯状であるけれども、これに限定されることなく、他の形状であってもよい。

【0038】

【発明の効果】本発明によれば、背板の下部付近に背板によって支持される記録紙の下端を弾発的に支持する弾発支持手段が設けられるので、使用者が衝撃力をともなう記録紙を給紙装置に挿入した場合でも、弾発支持部材が記録紙を挿入したときの衝撃力を吸収することができる。したがって、記録紙を給紙装置に挿入するときの衝撃力が、弾発支持部材によって緩和されるので、記録紙が底板の方まで入り込むことを防止でき、記録紙を送給するときに複数枚を同時に送給することがない。

【0039】また本発明によれば、弾発支持手段は、角変位可能な揺動支持片とばねを含むので、記録紙が給紙装置に衝撃力をともなう挿入されたとき、揺動支持片は角変位して衝撃力を吸収し、衝撃力が除かれた状態で記録紙を静置したまま揺動支持片の載置面と背板の支持面とのなす角度が、 $\theta 1$ となる予め定める位置に保持される。したがって、給紙装置に記録紙を挿入するとき、記録紙が挿入時の衝撃力によって揺動支持片の載置面の方に入り込むことがなく、また、記録紙の分離送給

を開始するとき、揺動支持片の載置面と背板の支持面とのなす角度が、予め定める好適な角度 $\theta 1$ に保たれるので、記録紙を1枚ずつ確実に分離送給することができる。また、揺動支持片の載置面と背板の支持面とのなす角度 $\theta 1$ は、背板の支持面と底板の案内面とのなす角度 $\theta 2$ よりも大きいので、分離送給の開始された記録紙は、底板の案内面によって送給を抑止されることがなく、円滑に送給される。

【0040】また本発明によれば、送給される記録紙の寸法に応じて、記録紙の下端を支持する揺動支持片の数が異なる。したがって、揺動支持片の載置面が記録紙の下端に当接して記録紙の送給を抑止する力が、記録紙の下端に当接する揺動支持片の数によって調整されることになり、記録紙の寸法に応じた数の揺動支持片と記録紙下端との当接によって、記録紙の分離送給が円滑に行われる。

【0041】また本発明によれば、揺動支持片の載置面に給紙方向に分布して形成される凸部が設けられるので、記録紙が衝撃力をともなう給紙装置に挿入された場合でも、凸部が滑り止めの機能を発揮し、挿入された記録紙の下端を確実に受け止めて、記録紙が揺動支持片の載置面の方まで入り込むことを防止できる。したがって、記録紙が衝撃力をともなう給紙装置に挿入されたとき、記録紙を1枚ずつ確実に分離送給する機能を一層強化することができる。

【0042】また本発明によれば、記録装置は、記録紙を1枚ずつ確実に給紙することのできる給紙装置を備えるので、記録紙を印字する場合に複数枚の記録紙を同時に費やして印字する無駄を発生することがない。

【図面の簡単な説明】

【図1】図1は本発明の実施の1形態である給紙装置1の構成を簡略化して示す断面図である。

【図2】図1に示す給紙装置1を備えた記録装置2の構成を簡略化して示す斜視図である。

【図3】図1に示す給紙装置1の構成を簡略化して示す斜視図である。

【図4】角度分離法を利用した給紙装置81による記録紙73の分離送給の概要を示す図である。

【図5】給紙装置81に挿入された記録紙73のうち外層の複数枚の記録紙82が、背板71と底板75との境界を越えて、底板75の案内面76にまで入り込んだ状態を示す図である。

【図6】給紙装置1に記録紙5が挿入され、押込力が加えられた状態を示す断面図である。

【図7】本発明の実施の第2の形態である揺動支持片86の載置面87に凸部88が設けられた斜視図である。

【図8】図7の側面図である。

【図9】図8の記録紙送給の状態を示す図である。

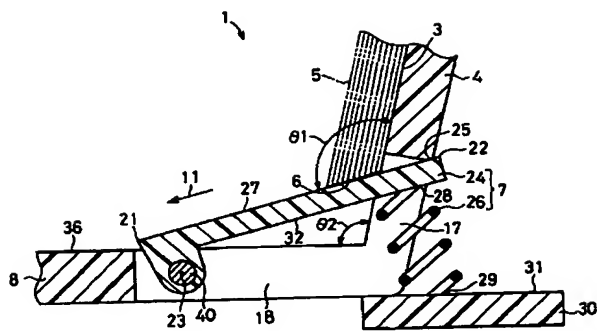
【符号の説明】

1 給紙装置

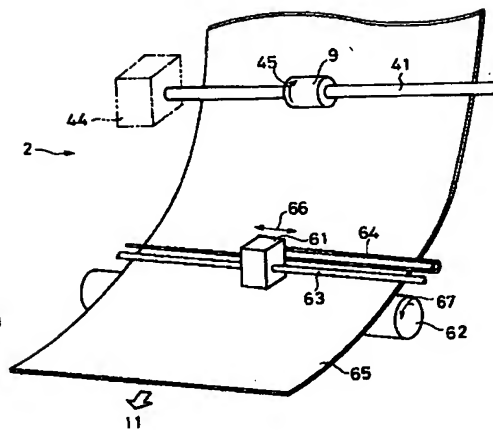
- 2 記録装置
- 4 背板
- 7 弾発支持手段
- 8 底板
- 9 給紙ローラ
- 24, 86 揺動支持片

- 26 ばね
- 41 ローラ回転軸
- 61 印字ヘッド
- 62 プラテン
- 88 凸部

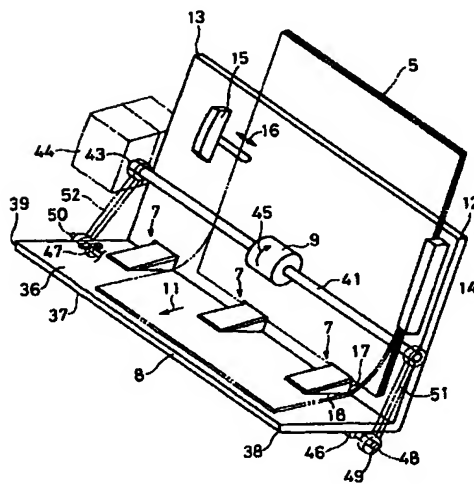
【図1】



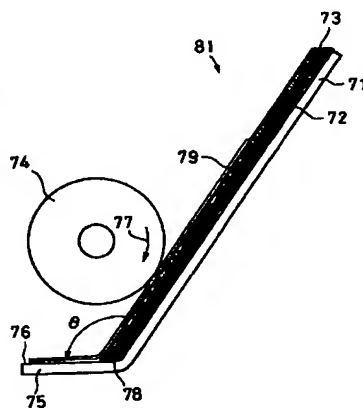
【図2】



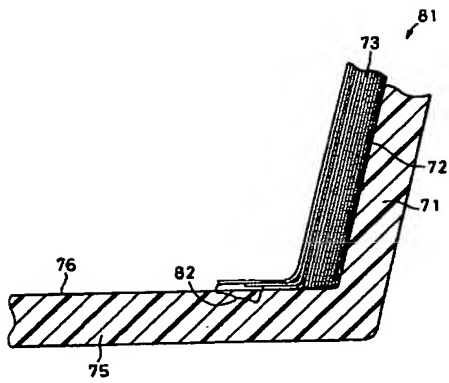
【図3】



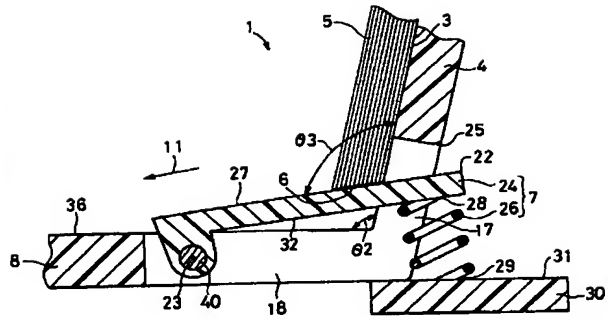
【図4】



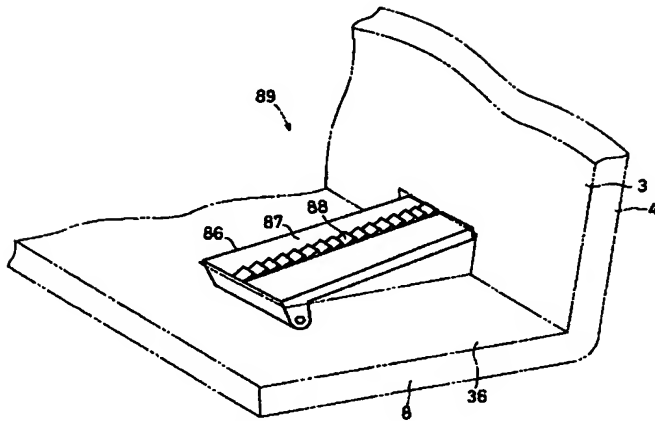
【図5】



【図6】



【図7】



【図8】

【図9】

